Art.
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*LIGHT: FINE ART THE SIXTH

See Trans. Ill. Eng. Soc., Vol. XIII, No. 7, Oct. 10, 1918

A RUNNING NOMENCLATURE TO UNDERLY THE USE OF LIGHT AS A FINE ART

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By MARY HALLOCK-GREEN
1424 MASTER STREET
PHILADELPHIA, PA.

* Address delivered before the Illuminating Engineers' Society April 19 1918, at the Engineers' Club, Philadelphia, Pa.

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HISTORY

WORK begun "circa" the year 1906.

First public rehearsal, Egyptian Hall, Philadelphia, April 15, 1911.

First public concert, Perkiomen Seminary, Pennsburg, Pa., February, 1912.

Second public concert, Dayton, Ohio, March 26, 1914.

Presentation before the Tenth Annual Convention of the Illuminating Engineers' Society, September 18, 1916

Address delivered before Illuminating Engineers' Society, Philadelphia, Pa., April 19, 1918.

Underlying patents applied for 1918

1424 Master St.,
Philadelphia, Pa., U. S. A.

To the Librarian.

Dear Sir:

This "brochure" is donated to your library. No sum of money can repay for the future value, the labor, research and initiative entailed. But the paper and ink cost definitely, and the typesetter gets what is denied the student and artist.

If in your emergency drawer you have a dollar to cover these, optionally to yourselves, surely to further a new fine art for the world is worth this.

The first movement of the Moonlight Sonata by Beethoven with a light accompaniment score, will be ready shortly as the first example of the sort. For reasons of record this should be possessed by your library.

Very respectfully yours,

Mary Hallock-Greenewalt.

LIGHT: FINE ART THE SIXTH

BY MARY HALLOCK-GREENEWALT

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It is humbly I stand before you and in this building. You do the work; we artists come along and reap the fun. Fun, did I say? And yet you, more than others, I think, would grieve at the blind groping and wasted labor, the flapping around after wrong trails, that has been gone through these dozen years of really hard thought and really hard work on just a pretty idea; labor which any one of you could have saved me, and all because in nearly all this time I was not even conscious there was in existence such a thing as an illuminating engineer, and my finding him finally was purely accidental.

My introduction to your vocation came as a result to the following "spark": How utterly enchanting to present these phrases of music, clothed with that colored lighting atmosphere best suited to them! *How utterly enchanting to present these phrases of music clothed in that colored lighting atmosphere best suited to them!*

Atmosphere, in the general use of the word, so conditions, so binds down the artist. If in a small gathering of a dozen people or more, one unsympathetic auditor can destroy his capacity to deliver, how much is he capable of being attracted by so subtle and supporting a surrounding medium within which to launch his interpretations. Corot was fifty-three years old when he suddenly realized the atmosphere was to paint, and then his fame came. Other people had painted atmosphere; he staged it.

Sunlight makes the world sing, why shouldn't light help the song sing.

The whim came at a given moment; the vision was of a certain instant, a juxtaposition of mental cells heretofore foreign to each other in my mind, and still foreign to each other, except I deliberately exercise choice regarding their being linked. Psychologically, this is an important point to the question. Immediate

action followed the notion once gotten. There were mercantile reasons surrounding "piano performance" which made it seem possibly an assisting move to do this; besides, there was no idea of the unending difficulty of the task.

There was light, to be sure,—I required light. Grasped from the side of the aesthetic need, that seemed all that was necessary. It was forgotten that difficult, huge, immense as the aesthetic is, in its utter impalpableness it still must stand on a concrete base. It cannot do without the engineer.

On the other hand, to take that material called light away,—away from the useful,—and make it a sentient thing: use it as poetry makes use of words, or architecture makes use of stone; to turn it into an art that can play at will on the spinal marrow of the human being, remind him of the Holy Ghost and the utter sheerness of beauty, that is a labor which can be done only by the artist.

To make light mobile to music, to put it in sympathetic union with any other art, static or of succession, to give it speech of itself, is as difficult to do for one whose lifelong training has not been that of artist as it would be for a musician to alter the composition of a light, or for an illuminating engineer to play a piano concerto with orchestra.

I have devoted a lifelong labor to music, and there is nothing of importance I have ever done, outside of being a mother and taking a charitable interest in the status of womankind as a whole, that has not been connected, intimately connected with this art. And it is on this standpoint: on the footing of that which only a musician, only an artist could have arrived at, that I feel justified in having encroached, if only with envious eyes, on a field belonging, by every right, only to you.

Atmosphere—light, pure and simple—was always a part of the idea; never the flat, never the two dimensional. It must be so. The flat carries with it form, no matter how vague and transitory the succession, and that is *the picture.* The province of light is that of an all-enveloping medium which does not interfere with forms or interject shapes not already in existence. In what way does it obtrude itself on our attention then? *Through its intensities.*

I do not want to minimize, for a single instant, the glory which I felt in the beginning, and do now feel, would come to the human

being on being able to view at the same time the wonders of tone and the marvels of color, brought on wings of light and mobile to the unfolding tone. But it was through the empirical,—through experience, experiment, practice,—that was brought out the amazing value which varying intensities of light have as a means of lending added significance to short-lived emotions, such as those embodied in music. That varying intensities of light are the important factor in enhancing the emotional expression, this is the firm centre which conning the subject over for the last twelve years or so has brought forth. If it were a question of one or the other only: a mechanism controlling color, or one controlling intensities, the palm must surely be given to the latter as *the* indispensable factor. As mankind embraces womankind, however, so is tint inseparable from light. Let us not seem to be ignoring the one in speaking of the other.

Mercifully the world intervenes countless prisms to keep us from forgetting the color while looking at the light. The atmosphere, the moisture in the air, the dewdrop, the sheet of water, the pane of glass, the crystal, the precious stone, the things manufactured by man, turn the facet first on the violet and then on the rose. The painter's eye loses not a glint. And so the selfsame thing, according to the prismatic medium in which at the moment it happens to be located, can be fashioned first in one color, then in another, no one color carrying any one emotional attribute all to itself. It speaks according to the relationship in which it is found.* *To the aesthetic question this is all important.*

The attributes which make up any art are never few. Poetry is such things as music is made of: accent, rhythm, tone color, intensity, pitch. Painting is form, color, perspective, composition,—just to denote. But in every art, one attribute is, if anything, more indispensable than another. The shiftings of time are, for example, the life and breath of music; they give it its expression—they are its vertebra—intensity, the loud, the soft, being an added asset.

Let us give the Captain of Industry, for once, his full due. It was Mr. Pierre du Pont who, though placed at the forceful centre of the world's affairs, still found time to note that the inten-

* Dr. S. L. Pressey: "The Influence of Color upon Mental and Motor Efficiency." Harvard.

sity lever of his pianola alone did not make expression, whereas the tempo lever alone did. But, then, the dynamic would not be so novel to Mr. du Pont; the temporal, all must admit, keeps one stepping.

In an art created by light alone, the intensities, the dark, the light, their manner of succession, the fineness with which their dynamic shadings are used, would be the all-important factor, the indispensable; the breaking up of the light into its component rays, an added, though very great, added element of beauty.

Physiological reasons are back of both facts.* It is the influx of new blood delivered against the brain through the basilar artery every so often a minute, that has gaited man's rhythmic art to a certain range of portent speed. That range of time variation covers all the conditions of exhilaration, sadness, quiet, repose which can affect the human pulse, and is naturally passed on analogically to similar expressions used by him in the arts of succession. It has been the nearest beat to us since we achieved being, and we naturally imitate it in all the linked meanings it has subconsciously taken on.

It takes no psychological laboratory to tell us that the changes of light—the dark of the night, the bright of the day—have become similarly inextricably woven into the experiences of man from the time that he was only a bit of living protoplasm till now. Surely, fear, gloom, foreboding, depression, mystery are connected with the blackness of night, whereas hopefulness, joyousness, happiness, stimulation are part of the brightness of midday.

But in spite of the commonplace of the theorem, let us quote the *Journal of Psychology:*† "Out of 389 observers, 237 note psychic effects of depression more or less marked from the passing of a cloud over the sun."

Did we speak of the amoeba? We have proof that the insect also feels this that the psychologist found regarding man, for insects change their day song into their night song on the passing of a cloud over the sun,‡ and the tempo of their rhythms gets subdued

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* See "Pulse and Rhythm" by Mary Hallock-Greenewalt in *Popular Science Monthly* for September, 1903. "Pulse in Verbal Rhythm" by Mary Hallock-Greenewalt in *Poet Lore* for the summer of 1905.

† January, 1903, page 73 (G. Stanley Hall and L. Smith): "Reactions of Light and Darkness."

‡ "Stridulation of Some New England Orthoptera," S. H. Scudder, Boston Soc. of Nat. Hist., October 23, 1867.

on that side of a hill where the moonlight is less bright than where a sister choir is chirping.*

Did we speak of the insect? We have proof that the flower feels this that the psychologist found about man. "The little Leguminosa performs a sort of perpetual and intricate dance in honour of light. Its leaves live in a state of rhythmical, almost chronometrical and continuous agitation. They are so sensitive to light that their dance flags or quickens according as the clouds veil or uncover that corner of the sky which they contemplate."†

If a flower senses the changes in light that a mere cloud can make, how much more can we make out of it. And how are we "to make out of it." Purely it is only a matter of refining to the nth degree something which is already in existence; refining it, however, till the product begets as new and distinct a being from what has gone before as any one thing can be said to differ in kind and entity from another in this world. How has this been done in the other arts? How does a child learn to walk? By fastening itself onto something else till it can go alone. Painting was first hung onto things seen till it finally become a thing of itself. To dance is the tapering of to walk. To sing was first a human cry.

The subtleties of light, spirit incarnate, can be well matched in their ethereal beauty by one other thing: the shadings of sound. Here can be made a fitting marriage of mates worthy one of the other. Both are imponderable, vibrating atmosphere, vibrating ether. What other two things can flow along *changing with that which may be measured only by the sensitiveness of feeling*, spiritual enough to laugh at the impositions of matter?

But just how are they to be matched together? By what logic? By what fitness? We will tackle the analogies later where, through color, they become infinitely more subtle. Here let us pose the fact that surely a sombre melody will suggest darkened light, a happy tune brightened light; the high of music calling out rather the bright of light, the low of music, the dark of light. Since brightness stimulates the pulse of the human being as well as the creature, since the pulse by subconscious analogy impresses its time variations on the rhythmic output of the animal and human

* "The Songs of the Grasshoppers," S. H. Scudder, *The Am. Nat.*, Vol. II, p. 113, May, 1868, No. 3.

† "The Lives of the Flowers," Maeterlinck.

being so a direct scientific contact may be established between brightness and the time rates of music but only as "the pavilion covers all the merchandise."* We hasten to add that this sort of pairing is the crude of the sum total. It is the crude, not because high: bright, low: dark, happy: light, sad: dark, fast: bright, slow: dark, are not perfectly sound analogies, to begin with, but because choice, taste, those working means of the artist, can go infinitely further. It is quite possible to decide on giving a background of lowered light to high music and vice versa. It is possible to combine light and music as one wills. *The artist "saw it was good."* That is the only necessity.

Let us show by illustration what we mean by fitting the intensities of light to the emotions of music. Let me play you the first movement of the "Moonlight Sonata," by Beethoven, so well fitted by name and context for illuminating the point. I will play it through only with a monochromatic light, fitting the dark and the bright only to the music without change of tint.

The need of man for aesthetic expression has never been stopped by poverty of means. I have in my possession a thin, crooked, dirty yellow candle, not half so thick as my little finger and primitive in the extreme. It came from a little church in Tarsus, where such as itself—crude, simple rough, in bulk less than a lead pencil—were raised by means of their light to the point of expressing all the sanctity of the church and the beauty of holiness; and this at that intense centre, the church's beginning.

Much can be done by even the manner of raising an eyebrow or tapping on a table.

Whatever we may say further in this paper, it is always to be understood that the instrument for expressing by light may be made just as small or as splendid as one will or can.

(Here was played the Moonlight Sonata of Beethoven, accompanied by varying intensities of monochromatic light and no change in tint.)

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* See *Popular Science Monthly* for September, 1903, "Pulse and Rhythm" by Mary Hallock.

We have been dealing with the imponderable, acting on the imponderable, with sensation playing on feeling. There is a capacity finer still: that of arriving at conclusions through that which one cannot see, which one cannot feel, which one can only think. Grind down abstractly with the brain, complete the circle of knowledge regarding any one point, thing, or phase of a thing, and the subject matter promptly tumbles into shape, and, most important, the *underlying mechanics necessarily simplify.*

As long as this subject was seized from the color end, it must have remained, mechanically speaking, a tangle, which no amount of intricate light unit arrangement could have quite circumvented. When the flower—the insect, called out intensity, intensities of light alone can play on the sensations, then variegated colors took their place as the ornaments to the idea and quantity stepped forth as the essential. The mechanics, in other words, are intricate beyond means, viewed from the necessity of handling colored lights of myriad hues. The matter looks different when it is seen that intensity gives the myriad shades, only so many times multiplied by the seven prismatic colors or their three primary tones.

The all-important factor, mechanically speaking, became, then, the devising of a mechanism through which one could deal out quantities of light at will as subtly as a violinist feels out timbre or a singer gives forth overtones.

We have here devised such a control, represented by this drawing, which we hope will fill every bill. I wish it could "foot every bill." Its mercantile success would then be assured; every person in this world would buy one. We have not considered making it work by the feet, for this reason however: The length, strength and heel support of the foot offers advantages no one will gainsay. From the point of need which brought this drawing forth, the controlling of light intensities by means of the air pump principles has technical logic back of it. Any play of feeling set going from within the human being, must take account of a give and take as subtle in motion as that, conscious or unconscious, of the lungs and heart, not to mention still finer sources of physiologic perturbance

There is choice as to the muscular "feel" best suited to the governing of an increase and decrease of brightness as sensitive as

feeling itself. It would be extremely difficult, for example, to hold the hand up in the air for the length of time required while moving a button over a minute space in a long span of time.

A certin ampleness of action would be needed to take account of all the whimsicalities, surprises, accents and transitions which light might be called upon to express.

Fluid pressure has been chosen, because it offers fluid control. The pump operates a friction drive, which, through the regulator principle, cuts off or increases supply to light choirs, no matter where situated, each of which is manned by its own motor-driven resistance slide. These choirs can be single lights or massed lights, lighting a fraction of a stage or an entire auditorium. The lights may be manned by any sort of filter required—rolling, shifting or static, according to the fineness of results aimed for.

It is, of course, useless to use any of the spectrum curves not found in the lamp itself. The evening up of the deficient color proportions within the light may be made up by the use of lamps of greater or less power, as the rays of a given color are fewer or greater.

It is certain that rarely beautiful filters, colored contiguously so as to isolate the spectrum colors found within the lamp and merging one into the other at the point of contact, can be made out of glass, acetate of cellulose, or a noncombustible celluloid just announced by a Japanese firm.*

A thicker medium will give a better result than a thinner, but in every case the filter must be tuned to the lamp.

A rolling filter, dyed to synchronize with the successions accompanied, will still further simplify the light units used, as one is less than three or seven.

We have found a spacing of five-sixteenths of an inch to every beat of music satisfactory even for a fifteen-inch lamp opening. Fortunately, one unit of beat, not inelastic, of course, underlies all music.

A drama of light and sound alone undisturbed by object setting, can be gotten by playing on low intensities. It has appealed to me to have the players and their instruments out of sight.

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* Refer to Darby and Darby, 220 Broadway, New York.

In other words, then, this drawing, now in the hands of the Patent Office at Washington, no matter what the space illuminated or amount of brilliance capacity used, allows of the increasing and decreasing of light intensities, similarly to the manner in which one increases or decreases the loud and soft of music with a capacity for timing suited to even the accents and sudden emotional transitions possible to the dynamic shadings of sound or any art of succession.

Simplifying the question to dynamic control makes it easier to apply light to mercantile propositions. We have here a second drawing, showing the use of tracker board and rolling perforated paper for attaining lighting ends. This principle can easily be used with pianolas, aeolians and like mechanical instruments, but need, in no sense, be confined to them.

It is proposed to use with the phonograph the principle of revolving color discs for attaining light effects, the blades of transparent material in desired proportions, revolving over lights, and changeable for desired tints.

If one could dream, one could conceive of machine, blades, lights, placed in loveliest alabaster, a "light" home for rich overtones. Parchment, glass, acetate of cellulose, or like materials, offer makeshifts for the richer material mentioned above. The lids to many mechanical instruments stand in the position of reflectors, and many of their cases need not be altered for want of space.

A cunningly devised nomenclature is really back of the amazingly intricate development of the art of music. Certainly one art, that of poetry, has suffered on its rhythmic side, at least, for want of symbols invented for orderly purpose. The rhythm of Latin prose has been entirely lost for want of it.

Rather than err on this side, let us at once suggest a nomenclature to guide in the repeated use of light as an art, and to hold fast that which one may have already gotten. By its means the same sequence of light play may be used by different individuals in different parts of the world, and a repetition of light effects once gotten could be had without the time spent and trouble undergone on reconsideration of the same problem.

Sensation can make use of gradations infinitely finer than those called for by everyday use. The time variations which make

expression in music, for example, are so fine as to be only felt, scarcely to be measured. Degrees of darkness, in none of which objects could be plainly seen, would not count in daily life. They could speak with the resonance of a cannon in this art.

We subjoin the thesis: A Nomenclature to underly the use of light as a Fine Art.

I think that the fitting of the intensities of light to the playground of the amphitheatre, even to an art as subtle, abstruse and artificial as music, would be subscribed to by anybody. The subject arouses greater debate when it is said that these emotional subtleties can find their analogies in color; and yet, of the two, the latter offers the subtler phase. But, then, that is according as to whether one likes the monochromatic drawing as well as the variously colored print or not, not forgetting the supreme preeminence in beauty, which light in itself has over all other media of which art now makes use.

How can a phrase of music suggest a tint? How can a note suggest a color? How can a whole piano in its entire scale suggest a color different from that of another piano? How can a violin suggest a color different from that of a trumpet? How can one person suggest a sheep while another suggests the cat, or even an elephant or seal? Why is analogy?

There is a whole literature on color audition and kindred associations. Here are a few words out of one short pamphlet of fourteen pages only, labelling them:* "Synaesthetic—a person whose thoughts are colored." "Psychochromaesthetic—a person whose mentation is chromatic." Think of this, "once,"—a person whose whole mind is colored; where would the things colored come in? "Tastephotism—odorphotism—touchphotism—painphotism—temperaturephotism." Here the eye goes and the ear comes in, and, of course, the same could be repeated with every other sense and senses combined: colorphonism, odor-, touch-, temperature-, painphonism. I suppose this is a learned literature. Let us, just for fun, tear it in two right here and throw it in the scrapbasket. The whole brain is one associated or linked sensation. The whole world could scarcely hold the books on the subject, for language itself is made up of it. When we say "good" morning, "loud" clothes, "swearing" colors, we are linking sensations.

* "Colored Thinking and Allied Conditions," *Science Progress*, 1914.

When a Frenchman calls a baked potato *a potatoe* in its dressing gown,—"pomme de terre a la robe de chambre,"—he is doing "some" linking of sensations. "Some" linking, slang though it be is "some" example of itself. A little colored girl, nine years old, came into a room where a bunch of pungent paper narcissus stood. "My, Miss Anna," she said, "but these flowers do smell out loud." She was linking sensations. The city banker's son was described at the moving picture show as a "high stepper whose neckties sounded like a bread riot." The thing harks back to the categories,* to those attributes which underlie all things: quality, quantity, extension, weight, time, space. Similar qualities can link remotely dissimilar things. A heavy disposition is like lead. Should this linking of sensations become inevitable—not to be rid of—like the constant sounding of the note A in the great Schumann's mind after he had worked his mind to death for our benefit, then the matter becomes sad, becomes different, because it is a sign of deterioration, or disorder, in the mental mechanism. If you had to see a peach every time you said a girl was a "peach," that would be sad. But to exercise choice deliberately between the fitness of this with the fitness of that, to enhance this of a certain quality with that of a certain quality, surely that is one of the glories of the human mind. *It takes no reach to include music and light in the play*

As a simple sample of how intensities and tint would interplay, let us go back in thought to the first phrases of the Moonlight Sonata. We are satisfied with quantity of light until the melodic note ushers in a new factor. *The stage has been set. The prima donna appears. Who is better fitted to the role than a color?* But here, ah here, the intense—the real labor of the artist begins: to exercise choice while all the threads are kept firmly held. Behold! A phrase, a color, just this,—but here is the way it would go: Shall I give this melody a pink? The notes are pungent, clear, sharp, not high, in the middle. Would a clear blue have sufficiently these qualities? How high a pink shall it be? and just what value? What average of the color shall I strike that I may take its paler shades for still higher melodies later? Where will the color begin and where cease? How frequent can the changes of intensity and tint be and not tire the muscles of the iris and the nerves of the

* Kant's "Critique of the Pure Reason."

retina? And so it goes. The exercise of choice while holding on to all the threads is the only thing to lead them to the successful conclusion.

Pity the artist and be very kind to him or her. There is no limit to the number of threads to be held, and the manner of handling the same thing differs with every individual and with every moment.

Then, too, color itself has its own ideas, its own whimsicalities. It is the worst sort of capricious chameleon, taking on a different hue according as to what is put next to it or before it. Memory is too strong for succession to escape the taskmaster who holds sway in the contiguous use of color. The after impression is simultaneous though made in succession.*

One does not forget the spoilt phrase in the otherwise perfect interpretation. There is nothing autocratic about this choice of intensity and hue for any given work; no more so than that each person should wear but one color dress. Art means the filtering through the individual, and just as each individual differs from another, so would the exercise of choice in one differ from the exercise of choice by another. There is no organic necessity between the interpretation and the thing interpreted. You have seen how we can do the Moonlight Sonata monochromatically in any of the tints, and just so variously can choice differ in different individuals for the selfsame composition. Not only this, but the same individual would clothe differently different interpretations of the same work. The same symphony under one conductor has a different entity from one of itselves under another baton; and both may be, in their way, equally beautiful. A certain fitness there must be, that the physiognomy be not distorted. A noble thing turned into a jig ceases to be itself, and vice versa.

The exercise of choice, backed by that which is learnable, is the one master in art, light and color not excepted.

You see before you what we have gone through in arriving at a fitting light accompaniment to four short pieces, all of them together not taking more than five minutes to play. Future work will, of course, be infinitely easier in comparison; the mistakes, at least, need not be repeated.

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* "Time Eternal" by Mary Hallock-Greenewalt.

The underlying work for these light interpretations began in the year 1906, first with the careful study of the composition to be interpreted, looked at from the light support viewpoint. With that as a basis, the piecing of gelatin films together, according to the succession determined upon undertaken, and the crude reel made. The imposed layers by turns intercepted and nullified the rays, and we turned to the stereopticon, thinking the fault lay with the lack of lens. Then followed the carefully planned oil painting as a basis for the stained photographic film, and again a crude mechanism. Five-sixteenths of an inch was the space marked to every beat of music. That the same elastic unit of beat underlies all music helped considerably. By this time a non-inflammable film was allowed on the market. Pastels of the tints approximating what was wanted were prepared, and the acetate of cellulose dyed accordingly. This was made fifteen inches wide to go in front of a light unit with parabolic reflector, which gave very good results, of which you will be able to judge in a few minutes.

The tungsten light seemed to yield so poor a blue that it was thought a condenser, by bringing the rays closer, would help, and a light unit was developed with mirror reflector behind and condenser in front. I think that eventually both condenser and reflector units will be used for self-evident reasons: the pointed brilliance and the mellowed softness both have their speaking value.

It was the constant necessity of playing with shadows on these tinted sequences that brought out the all importance of the dynamic in the use of light as a fine art. It was helped to a sound base by my researches in "beat" or tempo.

The loveliest fine art of all will be this, the sixth to come into existence. With what strength it will speak, compared to the powers held among the others, no one can foretell. We prophesy for it a place among the first.

The manner in which the problem was tackled, as described above, is proof, I think, that the notion was original to myself. I had no knowledge of any labor, even remotely parallel, till after notice of my work had seen print, and then what had been done seemed not in the slightest to affect or interfere with my particular vision of it. Indeed color and music have been so here and there bandied about together because it happened to be the vocation of

that individual launching the idea. Had I been a reader of epic poetry or a pantominic artist this fine use of light would have been launched in conjunction with these arts since the categorical connection between light and music is no more than between light and any other art.

My press notices record a performance of mine of music done to a mobile lighting accompaniment, April 15, 1911, at Egyptian Hall, Philadelphia. The article which refers to this performance appeared in the *Philadelphia Press*, Sunday, March 12, 1912. It is this notice which, multigraphed, was sent to the leading newspapers of St. Petersburg, Rome, London, Paris, Berlin and other large centres of the world, as part of the publicity done to prepare the way for a continual tour as pianist which my managers felt I could expect. As it was, I did tour extensively that season and the next, and only the war prevented the Australian trip next scheduled.

The copy sent to the New York papers bore fruit in references to my work in light in an essay on the title "Seven Arts" by Mr. James Huneker in *Puck* and in his latest volume of essays. Proof that the notices sent to other parts of the world saw print is held in the fact that some three or four out of several dozen were returned unopened for want of sufficient postage. In many cities abroad "punishment" money has to be paid in addition to the insufficiency due, and it is to be expected that where a paper has paid money for the receipt of a communication, it will use what it has had to pay for. One of these returned letters with notice was saved for future copy and is subjoined.*

1424 Master Street,
Philadelphia, Pa.,
April 3, 1912.

* Dramatic and Musical Editor of *Journal De Bruxelles*,
Independence Belge, Belgium.

My Dear Sir:

It is through the advice of Dr. Talcott Williams, Associate Editor of the *Philadelphia Press*, and recently chosen as the first director of the *Pulitzer School of Journalism* of Columbia University, New York, that we venture to send you the enclosed notice at this time.

The details of the work have never failed to interest keenly the men and women with alert minds to whom they have been presented and on that score we hope you can give the paragraph prominent space.

I am,

Respectfully and indebtedly yours,
(Signed) F. L. GREENEWALT.

I played with a prepared mobile lighting accompaniment in Perkiomen Seminary, Pennsburg, Pa., in Feb., 1912, and in Dayton, Ohio, under the auspices of the new Young Women's Christian Association March 26, 1914. On September 21, 1916, at the Bellevue-Stratford, Philadelphia,—it is quite the most beloved performance of my life,—I played some numbers of music with mobile lighting accompaniment before the yearly convention of the Illuminating Engineering Society. I consider the results obtained in the Chopin "Prelude No. 2," the Debussy number, "And the Moon Descends on the Temple which was," and the "Turkish March" by Mozart at that performance as successful demonstrations of this art.

(*Note Continued*)

THE PHRASES OF MUSIC SHOWN UP IN BECOMING COLORS

Mary Hallock, pianiste, insists laughingly that it was in emulation of the mis-en-scene surrounding and assisting the opera stars, that started her using a color lighting accompaniment with some of her piano interpretations. Her labors in this direction, however, have been so subtle and painstaking, have represented so much work that this was only the occasion, the *cause* lying deeper in the consciousness, that the harmonies of sound appealing to a single sense could well stand the simultaneous *re-inforce* of an appeal to sight as well. Surely "the stars helped and the sea bore part" in a notion which clothes every beat and bar of music with a lighting atmosphere fitting to it and changing subtly with the moods and phases of the bars as they pass.

It dated from a suggestion made as far back as 1906 by a gentleman of long experience and critical authority that Miss Hallock play the "Moonlight Sonata" with a quasi-scenic setting such as a rising moon and cloud effects. This gave birth to a verity infinitely more subtle that each *quality* of phrase could be enhanced by the proper degree of light or dark as well as color best approximating its inward content, not exterior panorama. The temperament of one person will suggest a gray dress, whereas, to another red would be more in keeping. In this analogous way every phrase of a composition will hint at a sympathetic color lighting atmosphere of this or that value.

As to the value of a setting is impalpable as the tone vibrations themselves, no one who has heard a piano recital, with the sun sending its parting rays through the windows of a Chapel or Hall can doubt.

This idea has been worked out by this pianiste with an exactness which took account of every beat or bar in a given composition so that metronome marks and ritards were carefully accounted for in the color mechanism.

Four short pieces were first chosen with regard to distinct and favorable contrast. Two of them are by Debussy, the third is the inexpressibly dark and tragic second prelude of Chopin, and last, but not least, the Turkish March by Mozart. Of the two last the March is pitched, as one would expect, in bright red and blue, purple and gold; while the Chopin prelude suggests all that color found in the depths of the sea,—dark greens and browns, the repellent and the sombre.

One good result from this labor will be the elimination of those glaring chandeliers, torturing the eyes into a headache the next morning after every concert. *The first tentative rehearsal was given in Egyptian Hall, Philadelphia, Pa., April 15, 1911.*

It is well known that it is the crying envy of a painter's soul to come as near matching the essence of light with the pigment on his canvas as he can Whether playing with light will easily give splendors and richnesses of darkness as well as light heretofore only to be dreamed of cannot be determined without further practice. It is hard to imagine how one can get those singing browns and blacks of Whistler which one feels would be fitted to the detonations of the pipe organ, without the special attention of a painter turned on the filter. Certainly a master colorist would be needed with the brush and sprayer to get the mixed richness and quality worthy of the word wind and strings, the brass and tympani. I think the day will come when great artists will vie with each other in getting out these rolling screens. In these, they will not be copying the prismatic rays; they will be coloring with them. Care only must be taken that the rays be proportioned rightly for the painter's use, that no quality missing in the light will render their beautiful labor incompletely. No color knowledge can get more out of a light than already exists in it. Every known instrument has its irremediable disadvantages however.

To filter or not to filter, that is the question which should determine the composition of a light. This lovely side of the subject of filter tuned to light, and light tuned to filter, is worthy the attention of the kings of illumination. What woman is not constantly looking out for a king?

It is, after all, only a matter of tuning up to the seven prismatic shades found in a light unit and determining the combined proportions of which they are capable. The light laboratories may see this taken away from them into the chemical laboratory. I would prefer a prince of illumination. He at least can dye easier than the chemist can alter the composition of a light.

We beg to announce the matter as being in the following shape:

A running nomenclature for recording intensities of lights and tints.

A mechanism for controlling these intensities of light, with all the smoothness and time considerations required by the arts of succession, or any similar stage requirement. This may be used with lights, single or in choirs, the prepared rolling or shifting filters to be kept in the required unison, where necessary, by synchronizing meters

The tracker board and perforated principle as another control of kind and quantity of light. This is to be used in part with pianolas, aeolians and such like mechanical instruments.

Color discs, proportioned for any required tint, and revolving over lights to be used in conjunction with phonographs, automatic changes in the light units gotten through perforated cards, and changeable with every record.

Since Newton's time, a table of approximate ratios has been sought between the seven notes of the scale and the seven colors of the spectrum. As a working basis, it would be possible to take any succession of tints as a formula. Whether they approximate in ratios or not, has not the least to do with it.

To seek to fasten the form of one art on the form of another art, is, on the face of it, a mistake, if not an impossibility. They are organically different things. They will speak in different ways.

Light, in its very nature, is an atmosphere, a suffusion, an enveloping medium. To give it the sharpness of short succession, as with the notes of an instrument, is inconceivable. To give it a formful image on the flat, turns it into a kaleidoscope.—certainly not a new thing. To play with intensities of light and tint without forcing them out of the groove to which they cling, that will be a new joy for the artist as it once was the Creator's.

(The address ended with the playing, with colored lighting accompaniment, of Debussy's "And the Moon Descends on the Temple which was")

A NOMENCLATURE TO UNDERLY THE USE OF LIGHT AS A FINE ART

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A hieroglyphic, a symbolism, a denotation designed for the orientation of artists is a necessary adjunct to any art of succession.

A nomenclature underlying the use of light as a fine art similar to that used on the music page for recording music is necessary to this art's perpetuation and growth.

It will give written equivalents for a new kind of aesthetic creation. It will record for future performances of the selfsame sequence.

For obvious reasons a new art cannot make use of a notation already in use by another art. It is a different thing, using different medium, based on different laws expressing through a different sense.

Light is no more music than it is articulate language.

The letters of the alphabet, the written symbols which stand for language were of unconscious and gradual development. A musician may all his life not know the number of vibrations in any note he has ever played

Since we are consciously and so fully as possible, for a first step, planning a new nomenclature, let us put as much intelligible knowledge within its symbols as possible.

Compactness, care of the line space, the width, space is necessary. These marks may be called upon to wedge between the staves on the music page as an accompaniment to the music or they may underlie the dramatic line for similar reasons

To begin then: the main attributes of an art made up of light alone are: brightness, hue, saturation, time,—as time must be a speaking part of any art of succession—and space, as light is a thing for sight.

Since hue and saturation lie, as it were, in the lap of brightness, such a nomenclature must take care of the dynamics of light: the bright, the dark, first.

For reasons stated by me elsewhere (see *Trans. of the Ill. Eng. Soc.*), Vol. XIII,, No. 7, Oct. 10, 1918, intensity is light's main, its indispensable attribute when used as an art.

A table of brightness, from the threshold of vision to a high light yields twelve space numerals. From one hundred lamberts or one hundred thousand millilamberts to the one-ten-thousandth of a millilambert we get the unit and eleven ciphers—100,000,-000,000. Such an array of spaces may well be made use of to hold much that may be needed by the occasion. It makes a base carrying within itself a certain amount of definite fact regarding the medium to be used.

Decimal places and their figures can, in conjunction with a calibrated and similarly marked resistance slide placed conveniently at the manipulator's disposal, give any intensity desired but, as a nomenclature for the art, symbols to represent hue and saturation must be added not to mention still more cunning marks of expression.

We will therefore turn the ciphers into squares to give them four cornered room as well as be easier on the following eye, and mark the decimal commas and periods in such a way as, without dropping beneath the line, they will allow the ellision of those ciphers or squares not at that point needed for giving either the quantity of light or its color.

We then get the following:

| □□ ' □□□ • □□□ ‘ □□ |

Each comma must have its own distinguishing direction to allow of the elimination of useless spaces.

If only the hundred thousandths of a millilambert be needed, then the comma inverted toward the left and three last spaces will be all sufficient—‘ □□ |

If the tenths, hundredths, and thousandths of a millilambert are wanted, then the decimal point and what follows only will be required—• □□ |

Numerals and their value whether the ciphers are squared or no, used in conjunction with a calibrated marked and measured resistance slide will, of course, as we have said, give any light intensity desired, from the threshold of vision placed for blue and violet at .000012 millilamberts to a high brightness which in scientific reckonings has been taken as high as 100,000 millilamberts or 100 lamberts. In an art, however, the manner of using these intensities in their capacities for a gradual and insensible increase and decrease of brightness is all-important.

So sensitive must this use of intensities be that though the increment of least perceptible brightness has been measured at even varying intensities of white light and the spectrum colors, expressing with light like expressing with time in music will come with nuances which can be but felt though scarcely measured.

Whilst colors, like notes, are of distinct and definite demarcations one from the other, the attribute inseparable from light's power for emotional speech lies in its capacity for an insensible increase and decrease in brightness. It is so, that the day comes and goes; it is so connected with our capacity for a suggested feeling induced by it.

The use of the numeral and its similarly marked slide will denote for repeated use and uses just where the play of different increases and decreases of light shall begin and end.

Other marks will be needed to show *how* these "crescendos" and "decrescendos" of light intensities shall grow or ebb: the time such change shall take: how a uniform light shall remain for a given span: how the sudden accent of dark shall be asked for in a symbolism put on paper to represent such desired result.

There is no single word in the English language which takes the place for a gradual increase of light, of the word "crescendo" as used for a gradual increase in loudness in music.

There is the word brightening, to be sure, but this answers for silver polish, too The word "darkling" exists for a gradual decrease of light intensity and to give it its complemental mate we cannot do better than coin the word "brightling" for its reversed meaning.

No line symbols could be better for these two words than the forked lines used to represent the crescendo and decrescendo in music.

The amount of light said to stand at the threshold of vision for blue rays is, as we said, .000012 millilamberts; the amount of light given for exteriors at night is 0.001 millilamberts.

Suppose, then, a mark were wanted on paper to denote a gradual brightening from the threshold of vision to a bright twilight. According to the nomenclature planned forked lines from one to the other would denote this.

If the opposite from twilight to the threshold of vision be wanted the figures and lines would be reversed.

If the same even light were wanted previous to or after this swell of light, a straight line could denote it.

An even light held at the height of an increase and ebb could be logically expressed by straight lines: A sudden bright accent thus: Λ and a sudden dark accent thus: V It may be that the light will be wanted brightening in waves or billows when curves in the lines would mark on paper the desired effect.

The play of loud and soft is a secondary attribute of the art of music. The play of increase and decrease in light is *the indispensable* attribute of an art made up of light. For this reason there will be many variations of the forked lines which are found all sufficient for the crescendo and decrescendo of music.

The numerals giving the mechanical quantity are, of course, all important as a part of these marks and indispensable to their guidance.

Hue:—

Hue is brightness broken up into its component rays. Let our square ciphers and their forked lines then be as cups to hold, not only the intensity, but the color denotation also.

The primary colors are three. It is well known that any hue may be matched by combining the three primary colors: red, green and blue in proper proportions. But let us take the six chief spectral colors: violet, blue, green, yellow, orange and red, so doubling this primal quantity and build up our color indicators on them. Our marks, governing the intensities of light, became of use through their conjunction with a controlled and similarly marked resistance slide. The color must be gotten by means independently of this: that is, by means of filters placed in front of the light units and equipped with long distance control. Let us conceive then of a filter which in itself can by successive dyes, filter these main spectral colors according to its position in front of the light. If now the dye governing the filtering of one color be merged into the dye governing the following one, we could get out of that one screen violet, violet-blue, blue, blue-green, green, green-yellow, yellow, yellow-orange, orange, orange-red, red and red-violet or twelve colors. These colors made less saturated by three steps of white would yield: twelve hues plus thirty-six tints or forty-eight colors. Our intensity control would at every step

of intensity give forty-eight new tints or colors so that with control of saturation to be spoken of later, our twelve spectral monochromes can yield an infinity of shades or certainly as much as one could wish. It then remains for our squares to hold between them twelve or less symbols. We say less for such reasons as that red and green makes yellow, therefore a yellow symbol could be made up by a combination of the green and red symbols. We know that the eye irrespective of intensity and saturation can perceive twenty-two hues but this is the laboratory research extreme, moreover, combination of the same six symbols will yield these also.

Colors complementary to each do not make a new color. Not only this but the spectral color available in artificial illumination is not unlimited. The tungsten nitrogen-filled lamp has, comparatively speaking, much red and very little violet. The ratios are as follows: 751 of red to 233 of yellow, 103 of green, 68 of blue and 39 of violet or circa: one of violet to two of blue to three of green, to seven of yellow, to 21 of red. The violet of even a very strong light is only just perceptible. A variety of proportioned symbols for violet, for example, need give but little trouble.

Let us now go back to our squares and conceive of them as divided, if necessary, subdivided, each division colored to denote a hue. Three of the squares could give all manner of four combinations to the three colors and twelve squares not to mention the forked lines would thus certainly give the necessary symbol space for getting at the twenty-two hues which the eye can recognize irrespective of brightness and saturation change.

It is also to be remembered that it is not a question of painting forms, but of tinting brightnesses.

Since color printing is expensive let us use arbitrary symbols in black and white as a possible substitute in place of actual color. Let us not multiply symbols but take those already used by heraldry. My choice would be to keep the graceful names—or, argent, azure, gules, purple, sable, vert. We can keep also the charming names "sanguiné" and "tenné" for blood-red and orange but must give them the symbols combined which result in the colors, as vertical stripes with dots is red and yellow for orange. Since there must also be a unity in the repetition of tinted lightnesses and tinted darknesses as the same phrases are repeated in a composition so we can also use the heraldic phraseology, "of

the field," "of the first," "of the second" for repetitions of the same effects.

Let a square with dots inclosed, say, stand for "or" or yellow; white square, argent or white; square filled with horizontal lines, azure or blue; square with vertical lines, "gules" or red; square with slanting lines from right to left, "purpure" or purple; square squared, sable or black; square with slanting lines from left to right, vert or green.

When then, a numeral holds a horizontal lined square, the long distance control of the filter in front of the light moves this filter to the point where it filters out the blue rays, the whole numeral acting through the resistance slide governing simultaneously the depth or shade of blue, and similarly so on for all colors and all shades. For example:

The threshold value of brightness sensibility for blue is 0.000012 millilamberts. The threshold value of brightness sensibility for green is 0.000017 millilamberts. The threshold value of brightness sensibility for red is 0.00056 millilamberts. In our terminology when the above results are wanted, the first quantity or blue threshold value would be denoted by a square marked with a blue symbol, the second by a square marked with a green symbol, and for the third by a square marked with a red symbol. In all these the numeral plays through the resistance slide while the symbols held within the square or squares plays on the filter control.

Let us say now the colors are to be proportioned together and that a blue-green light is wanted of an .000017 millilambert intensity; then one square in blue the following in green would denote it. Change the places of these marked squares and the accent would come on the *green* and *green-blue* would be the result.

It is right here that stress must be laid on the fact that color sensations do not reach their full value immediately on application of the stimulus nor do they decay to zero immediately upon the cessation of the stimulus. It is for this reason that a rotating disc made up of several colors will give the impression of one color. It is only for this reason that the notes of music meant to act on the dot of time can never suffice as marks for a stimulus of leisure growth. Our forked lines give ampleness of time for color change.

Practice only with a given light system will show where extra symbols may have their own uses.

Saturation:—

From our experience the least trouble need be experienced from the need for lessening the saturation, made by the addition of white. White will turn red into pink, dark blue into paler blue, etc.

It will be difficult to isolate absolutely a spectral monochrome so as to be devoid of white. The filter cannot be prevented from fading.

It will be difficult to keep all vagrant light from filtering into the auditorium by some means or other.

One light shining through the transom of a butler's pantry into the Rose Room of the Bellevue-Stratford Hotel turned some rehearsals in colored lighting into a nightmare for the anxious operators—that one light did its effect on saturation so well. A similar rehearsal in the hall of the Engineers' Club at Philadelphia was made similarly disappointing, though the window panes had been covered with opaque paper, by an arc light a square away in the street below making itself felt through this apparently only partly opaque paper.

We know that red will show about ninety shades of saturation This represents results in accurate and minute scientific research on a restricted circular surface of red paper. A difference in color was noted every 4 degrees of the 360 degrees or about one per cent.

We know that whole color systems of notation have taken account of but ten shades and that increase of brightness will bring a lessening of saturation automatically with it.

If, too, a filter be dyed graduated to let more white light through toward one end than the other, this in itself will give control of saturation.

In addition to all these ways by which saturation will be lessened little pilot lights of white added to the powerful lights can furnish measured units of white to pale the color as needed.

On the paper these can be represented by pl, p2, p3, or by a symbol for a white light. In any case these marks can furnish the measures. One working table of color gives two steps only for unsaturated color.

Ensemble in light play:—

It goes without saying that where one or more light effects are to be used as a foil one to the other that two or more complete symbols will be placed one over the other as the scores of music for different instruments playing simultaneously are tiered.

Time:—

Since the capacity for marking time is inherent to the body the occasional metronome marks and the vertical bar lines of music will answer all the time requirements of the art of light succession also

I have the feeling that an art made up of light alone might utilize larger spaces of lime as a big day, a big night envelops much. But the heart is beating within, no matter how slowly the light panorama shifts and the heart gaits the attention. Longer, slower changes in light time can take place with music beating quickly within, so feeding away the impatience, but even minute lengths of sixty seconds are too long for the holding of attention except for an East Indian philosopher and he, from all accounts goes into fits over it. "Rest" marks used in music for absence of sound would here denote absence of light or blackness. "No Erg" would also mean the nothing of light.

Space lit:—

The amount of space lit must be made a "heading" direction. More lights for greater space and many times increased where play of color is wanted.

It is quite within the realm of conception that patches of variously colored light will be wanted, as let us say, purple over the cellos while blue plays over the violins. In this case the written word must give this direction. A colored light falling on a background of a different and supporting light suffusion would also need a special noting and will refer, naturally, to a resistance slide operating independently.

The beginning, the cessation of a given color must, of course, always be carried on the intensity mark.

Such directions as "gently," "violently," must, as in music, be given in words.

In all this it is to be understood that every nomenclature underlying an art is but a skeleton around which the artist must build his creation. It is so with the notes of music. It is so with the dramatic line. Not the finest of computed brightnesses will be all sufficient for the artist. Only his instinct, his practice, his taste will bring him where the light of his soul leads.

Another person may give a different light play to the same works, or the same author might under another mood give still another light accompaniment or vary one previously given. This elasticity of interpretation through light proves the art.

MARY HALLOCK-GREENEWALT.

Tout Prés
Wildwood Crest, New Jersey,
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